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<p>(21) International Application Number: PCT/GB82/00016</p> <p>(22) International Filing Date: 21 January 1982 (21.01.82)</p> <p>(31) Priority Application Number: 8101886</p> <p>(32) Priority Date: 22 January 1981 (22.01.81)</p> <p>(33) Priority Country: GB</p> <p>(71) Applicant (<i>for all designated States except US</i>): BONAS MACHINE COMPANY LIMITED [GB/GB]; Pallion Industrial Estate, Sunderland SR4 6SX (GB).</p> <p>(72) Inventor; and</p> <p>(75) Inventor/Applicant (<i>for US only</i>): GRIFFITH, John, Dalton [GB/GB]; Bonas Machine Company Limited, Pallion Industrial Estate, Sunderland SR4 6SX (GB).</p>		<p>(74) Agent: BRIAN, Dealtry; Eric Potter & Clarkson, 14, Oxford Street, Nottingham NG1 5BP (GB).</p> <p>(81) Designated States: AT (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), RO, SE (European patent), SU, US.</p> <p>Published <i>With international search report.</i></p>	
<p>(54) Title: TAPE FASTENER</p> <p>(57) Abstract</p> <p>A method of producing a tape having a hook type projections (6) for a tape fastener, the method including producing a tape so as to have straight projections (2) projecting from one side of the tape (1), the projections being formed from a heat deformable material, and deforming the terminal end of each projection to form a hook (6) by the application of appropriate heat and pressure.</p>			

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"TAPE FASTENER"

The present invention relates to tape fasteners.

Tape fasteners are already known in which two tapes can be joined together by pressing them against each other. One tape is usually a loop pile fabric, and the 5 other tape has projections attached to a surface, shaped so as to hook into the loop pile. There are two known shapes of projection end, one consisting of a hook and the other being a bulbous shape commonly referred to as a mushroom. The hook type projection does not damage 10 the pile fabric, but is relatively expensive to produce; whereas the mushroom type projection is cheaper to manufacture, but tends to tear the pile fabric, and thus shortens the life of the fastener.

It is an object of this invention to produce a tape 15 fastener with hook type projections which can be manufactured at a comparable cost of the mushroom type projection. It is a further object of this invention to produce an improved mating tape.

According to one aspect of the present invention there 20 is provided a method of producing a tape having hook type projections for a tape fastener, the method including producing a tape so as to have straight projections projecting from one side of the tape, the projections being formed from a heat deformable material, and 25 deforming the terminal end of each projection to form a hook by the application of appropriate heat and pressure.

Preferably the tape is woven and is produced by weaving two tapes simultaneously which are separated by strands of a thermoplastics monofil yarn, the strands 30 being severed to separate the tapes to produce two tapes having straight projections.

Other aspects of the present invention will herein-after be described with reference to the accompanying drawings, in which :-

5 Figure 1 is a schematic side view of a tape having straight projections prior to deformation;

Figure 2 is a schematic side view similar to Figure 1 showing the tape during deformation;

10 Figure 3 is a side view similar to Figure 1 showing the tape after deformation;

15 Figure 4 is a schematic side view of an apparatus for deforming the projections to produce tape as shown in Figure 3;

Figure 5 is a schematic perspective view of a first tape for co-operation with the tape of Figure 3;

15 Figure 6 is a schematic perspective view of a second tape for co-operation with the tape of Figure 2.

Reference is initially made to Figures 1 to 4 in which there is shown a tape 1, woven from any suitable yarn, having straight projections 2. The projections 2 are interwoven with the tape 1 and are formed from a suitable thermoplastics yarn such as a polyamide monofilament yarn. Advantageously the tape 1 is produced by weaving a pair of tapes simultaneously with the two tapes being joined and spaced from one another by strands of the thermoplastics yarn. The thermoplastics yarn is heat set and then severed to produce two tapes as shown in Figure 1 with straight projections 2.

To produce a hook end 6 as shown in Figure 3 on each projection 2 the tape 1 is presented to a hot surface 3 (shown in Figure 2) so that the terminal ends of the projections engage surface 3. The temperature of the hot surface 3 is chosen to be such as to cause softening of the thermoplastics from which projections 2 are made without causing melting. The time period of contact between the projections 2 and hot surface 3 is chosen so

that only the terminal portion 4 of the projections 2 is softened. The tape 1 is pressed toward the hot surface 3 so that on softening of the terminal portions 4, the terminal portions 4 deform as shown in Figure 2. The 5 surface 3 is chosen to be rough enough to restrain sliding movement of the projections 2 over its surface so that the non-softened portion 5 of each projection is resiliently deflected as seen in Figure 2. After deformation has been achieved, the tape 1 is removed 10 from the hot surface and the deformed projections are cooled. Removal of the tape 1 from surface 3 permits the non-softened portions 5 to return to their original positions thus providing a tape 1 as shown in Figure 3.

In Figure 4 there is schematically illustrated a 15 suitable apparatus for producing tape 1 as shown in Figure 3. The apparatus 20 includes a support 13 over which tape 1 is passed. The support 13 may be in the form of a table or conveyor.

A continuous belt 14 is arranged above the support 13 20 and is movable about a pair of guide rollers 14_a, 14_b in the direction of arrow M. The outer surface of the belt 14 is sufficiently rough to restrain relative movement between itself and the projections. The rate of movement of the belt 14 is arranged to be the same as 25 that as the rate of feed of tape 1 so that there is no relative movement between the belt 14 and tape 1 during its passage across support 13.

The belt 14 is also guided over a hot plate 16 which 30 has an inclined wall portion 16_a and a linear portion 16_b which is substantially parallel to the surface of support 13. The gap between the linear portion 16_b and the surface of support 13 is less than the combined thickness of tape 1 and undeformed projections 2. Consequently as the tape 1 is passed between the hot

plate 16 and support the projections 2 are progressively compressed by the inclined portion 16a.

The incline of portion 16a, the temperature of the hot plate and the rate of feed of the tape 1 are all chosen so that the deformation as shown in Figure 2 is achieved by the time the deformed projections leaves the hot plate 16. A cooling plate 15 is provided downstream of hot plate 16 to heat set the deformed projections 2. When the tape emerges from between the support 13 and belt 14 the non-softened portions 5 recover to produce a tape as shown in Figure 3.

The mating area of the mating tape may be conveniently in the form of a flat open mesh structure which could be either woven or knitted. One embodiment of such a tape (Figure 5) has the open mesh 7 supported on cords 8, with a backing fabric 9 to fasten it on to the product such that there is a gap 10 for receiving the hook end of the projections when pushed through the mesh 7.

Alternatively the same effect may be obtained by an open mesh fabric 11 (Figure 6) with a soft resilient backing 12 into which the hook ends can penetrate. The fabric 11 may be attached directly to the product. It will be appreciated that the tape 1 as shown in Figure 3 may be used with a conventional loop piled fabric tape.

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CLAIMS

1. A method of producing a tape having a hook type projections for a tape fastener, the method including producing a tape so as to have straight projections projecting from one side of the tape, the projections being formed from a heat deformable material, and deforming the terminal end of each projection to form a hook by the application of appropriate heat and pressure.
2. A method according to Claim 1 wherein the tape is produced by weaving two tapes simultaneously which are separated by strands of a thermoplastics monofil yarn, the strands being severed to separate the tapes to produce two tapes having straight projections.
3. A method according to Claim 1 or 2 wherein the projections are subjected to axial compression to cause the terminal end of each projection to bend, and heat is applied to the bent projection to heat set said terminal end.
4. A method according to Claim 3, wherein the tape is continuously fed into a passageway of less height than said projections, the entrance to said passageway being heated.
5. A tape having hook type projections formed in accordance with any of the preceding claims.
6. A tape according to Claim 5 in combination with a mating tape having mating portion co-operable with said hook projections for restraining separation of said tape and said mating tape.
7. The combination according to Claim 6 wherein the mating portion of said mating tape includes a fabric which is spaced from a backing by a predetermined gap, the fabric being of open



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mesh to enable the hook projections to penetrate into said gap.

8. The combination according to Claim 7 wherein the fabric is supported on a pair of spaced cords.

9. The combination according to Claim 7 wherein said gap is filled with a soft resilient material which enables the hook projections to penetrate into it.



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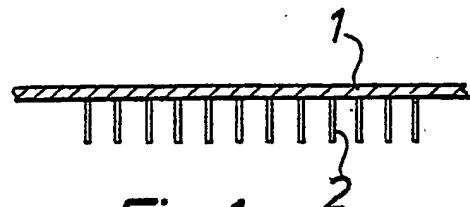


Fig. 1

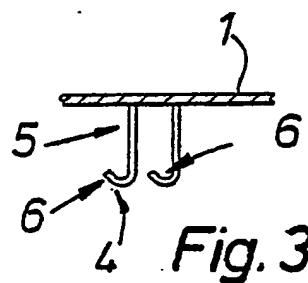


Fig. 3

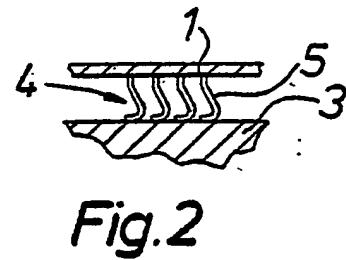


Fig. 2

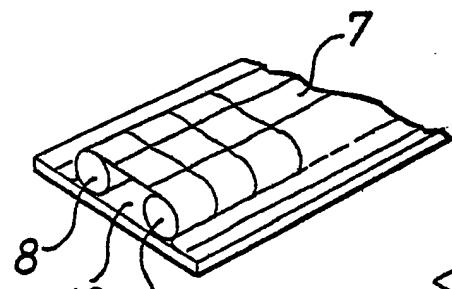


Fig. 5

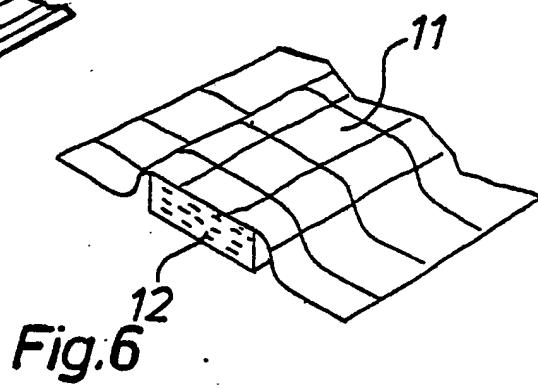


Fig. 6

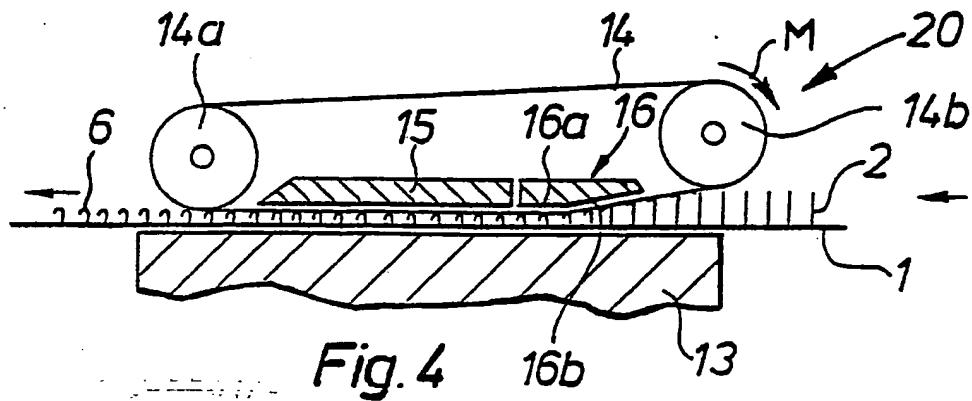


Fig. 4

BUREAU

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 82/00016

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all):³

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC³: A 44 B 18/00; B 29 C 17/02

II. FIELDS SEARCHED

Minimum Documentation Searched⁴

Classification System	Classification Symbols
IPC ³	A 44 B
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵	

III. DOCUMENTS CONSIDERED TO BE RELEVANT¹⁴

Category ⁶	Citation of Document, ¹⁵ with indication, where appropriate of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X,Y	US, A, 2820277 (FORSTER), 21 January 1958, see the whole document ---	1-5
X,Y	DE, A, 2443050 (FOESTER), 25 March 1976, see the whole document ---	1-5
X,Y	US, A, 3629032 (ERB), 21 December 1971, see abstract, figures ---	1-3,5
X,Y	US, A, 3708382 (ERB), 2 January 1973, see abstract, figures ---	1-3,5
X	US, A, 3031730 (MORIN), 1st May 1962, see figure 7 ---	1-3,5
X	DE, A, 2209944 (STOHR), 13 September 1973, see claims 6-8 ---	1-3,5
Y	US, A, 3767749 (YOSHIO CHIBA), 23 October 1973, see figures 3,4 ---	2 .1.

* Special categories of cited documents:¹³

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IV. CERTIFICATION

Date of the Actual Completion of the International Search:

13th April 1982

Date of Mailing of this International Search Report:

29th April 1982

International Searching Authority:

EUROPEAN PATENT OFFICE

Signature of Authorized Officer¹⁹

G.L.M. - GUY L. MAYER

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No ¹⁸
Y	US, A, 3708837 (YOSHIO CHIBA), 9 January 1979, see figure 3 ---	2
Y	US, A, 3320649 (NAIMER), 23 May 1967, see figure 5 ---	2
X,Y	US, A, 3905071 (BRUMLIR) 16 September 1975, see figure 5 ---	6-9
Y	US, A, 3753458 (LAZAREK), 21 August 1973, see figure 3, column 3, line 44 - column 4, line 5 ---	6,7
Y	US, A, 3143154 (CUPERTINO), 4 August 1964, see figures 4,5 ---	6,7
Y	GB, A, 1140576 (SELESTUS), 20 April 1966, see figures, claim 1 ---	9
Y	GB, A, 1187103 (VELCRO), 8 April 1970, see figures, claim 1 -----	9